1. An electrochemical cell system, comprising

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode opposite the membrane;

a second flow field in fluid communication with the second electrode opposite the membrane; and

a porous flow field member in fluid communication with the first flow field opposite the first electrode, wherein the flow field member comprises a porous support modified to provide a selected hydrophobicity, a selected hydrophilicity, a combination of a selected hydrophobicity and selected porosity, or a combination of a selected hydrophilicity and selected porosity.

2. The electrochemical cell system of claim 1, wherein the porous flow field member comprises a porous support integrated with a polymer or a combination of a polymer and an electrically conductive material.

3. The electrochemical cell system of claim 2, wherein the porous flow field member comprises about 5 wt. % to about 95 wt. % based on the total weight of the mixture of porous support material and about 5 wt. % to about 95 wt. % based on the total weight of the mixture of polymer.

4. The electrochemical cell system of claim 3, further comprising about 50 wt. % to about 80 wt. % based on the total weight of the mixture of porous support material and about 20 wt. % to about 50 wt. % based on the total weight of the mixture of polymer.

5. The electrochemical cell system of claim 2, wherein the polymer is selected from the group consisting of a hydrophobic polymer, a hydrophilic polymer, and a hydrophilic/hydrophobic polymer mixture.

6. The electrochemical cell system of claim 5, wherein the hydrophobic polymer is selected from the group consisting of polytetrafluoroethylene, fluorinated ethylene propylene, polyvinylidinefluoride, ethylene chlorotrifluoroethylene copolymer, ethylene tetrafluoroethylene, perfluoroalkoxy, tetrafluoroethylene perfluoromethylvinylether copolymer, and mixtures comprising at least one of the foregoing hydrophobic polymers.

7. The electrochemical cell system of claim 5, wherein the hydrophilic polymer is selected from the group consisting of proton conductive ionomers and ion exchange resins.

8. The electrochemical cell system of claim 2, wherein the electrically conductive material is selected from the group consisting of niobium, zirconium, tantalum, titanium, steel, nickel, cobalt, mixtures comprising at least one of the foregoing materials, and alloys comprising at least one of the foregoing materials.

9. The electrochemical cell system of claim 2, wherein the polymer is an elastomer threaded, woven, or stitched within the porous support.

10. The electrochemical cell system of claim 9, wherein the porous support is a carbon cloth.

11. The electrochemical cell system of claim 1, wherein the porous flow field member has a void volume of about 20 % to about 80 % based on the total volume of the flow field member.

12. The electrochemical cell system of claim 1, wherein the porous flow field member comprises a first layer comprising a first layer having a first hydrophobicity, and a second layer having a second, different hydrophobicity.

13. The electrochemical cell system of claim 12, wherein the first layer comprises a porous support integrated with an elastomeric material, and the second layer comprises a screen.

14. The electrochemical cell system of claim 13, wherein the elastomeric material is selected from the group consisting of silicones, fluoroelastomers, and combinations comprising at least one of the foregoing elastomeric materials.

15. The electrochemical cell system of claim 12, wherein the first layer has a first porosity and the second layer has a second porosity.

16. The electrochemical cell system of claim 15, wherein wherein the first layer comprises a porous support integrated with an elastomeric material, and the second layer comprises a screen.

17. The electrochemical cell system of claim 15, wherein the first layer comprises a porous support integrated with an elastomeric material, and the second layer comprises a sintered metal cloth.

18. The electrochemical cell system of claim 1, wherein the porous flow field member further comprises a catalyst.

19. The electrochemical cell system of claim 18, wherein the catalyst is selected from the group consisting of platinum, palladium, rhodium, carbon, gold, tantalum, tungsten, ruthenium, iridium, osmium, alloys comprising at least on the foregoing materials, and mixtures comprising at least one of the foregoing catalysts.

20. The electrochemical cell system of claim 1, wherein the porous support comprises a material that is non-oxidizable at anodic potentials of less than about 4 volts.

21. The electrochemical cell system of claim 1, wherein the porous support is a screen, a perforated sheet, a pierced sheet, a sintered metal cloth. an etched sheet, a felt, or a woven mesh comprising a material selected from the group consisting of niobium, zirconium, tantalum, titanium, nickel, cobalt, steel, and alloys comprising at least one of the foregoing materials.

22. The electrochemical cell system of claim 1, further comprising a second porous support contacting the first porous support and having a greater void volume than the first porous support, and a third porous support contacting the second porous support on the side opposite the first porous support, and having a greater void volume than the seconed porous support.

23. The electrochemical cell system of claim 22, wherein each of the porous supports is integrated with an elactomeric material.

24. The electrochemical cell system of claim 23, wherein the elastomeric material further comprises an electrically conductive material.

25. The electrochemical cell system of claim 23, wherein the electrically conductive material is selected from the group consisting of copper, silver, silver-coated spheres, niobium, zirconium, tantalum, titanium, steel, nickel, cobalt, mixtures comprising at least one of the foregoing materials, and alloys comprising at least one of the foregoing materials.

26. A method for forming a porous flow field member for use in an electrochemical cell, comprising:

sintering a support material to form a porous support; and

disposing an electrically conductive material in the voids of the porous support, wherein the voids are not fully occluded.

27. The method of claim 26, wherein the electrically conductive material further comprises a fugitive material.

28. The method of claim 27, wherein the fugitive material is selected from the group consisting of waxes, plastics, rubbers, and combinations comprising at least one of the foregoing fugitive materials.

29. The method of claim 26, further comprising heating the porous support to a temperature below the melting point of the electrically conductive material to remove the fugitive material.

30. The method of claim 26, further comprising sintering and compacting the porous support after disposing the electrically conductive material.

31. A method of forming a porous flow field member for use in an electrochemical cell system, comprising:

sintering a support material to form a porous support; and

disposing a polymer onto the porous support, wherein the voids are not fully occluded.

32. The method of claim 31, wherein disposing is by a method selected from the group consisting of liquid brushing, spraying, dipping, vapor depositing, and combinations comprising at least one of the foregoing methods.

33. The method of claim 31, wherein disposing is by molding the polymer onto the porous support.

34. The method of claim 31, wherein the polymer is selected from the group consisting of a hydrophobic polymer, hydrophilic polymer, and a combination of hydrophobic and hydrophilic polymers.

35. The method of claim 31, wherein disposing further comprises disposing a first polymer on the porous support, and subsequently disposing a second polymer on the porous support.

36. The method of claim 31, further comprising disposing a catalyst on the porous support.

37. The method of claim 31, wherein the support material further comprises a catalyst.

38. The method of claim 31, wherein the polymer further comprises a catalyst.

39. The method of claim 38, wherein the catalyst is selected from the group consisting of platinum, palladium, rhodium, carbon, gold, tantalum, tungsten, ruthenium, iridium, osmium, alloys comprising at least on the foregoing materials, and mixtures comprising at least one of the foregoing catalysts.

40. An electrochemical cell system, comprising

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode opposite the membrane;

a second flow field in fluid communication with the second electrode opposite the membrane; and

a porous flow field member in fluid communication with the first flow field opposite the first electrode, wherein the flow field member comprises a sintered metal cloth.

41. The electrochemical cell system of claim 40, wherein the sintered metal cloth is integrated with a polymer and optionally a catalyst, or a combination of a polymer, an electrically conductive material, and optionally a catalyst, wherein the polymer is selected from the group consisting of a hydrophobic polymer, a hydrophilic polymer, and a hydrophobic/hydrophilic polymer mixture.

42. The electrochemical cell system of claim 40, wherein the sintered metal cloth comprises a graded porosity.

43. The electrochemical cell system of claim 40, wherein the sintered metal cloth comprises a first layer having a first porosity and a second layer having a second, different porosity.

44. The electrochemical cell system of claim 40, wherein the sintered metal cloth comprises a first layer having a first void volume, a second layer having a second, different void volume, and a third layer having a third, different void volume, wherein the first void volume is greater than the second void volume, and the second void volume is greater than the third void volume.

45. A fuel cell system or a regenerative fuel cell system comprising

a cathode;

an anode;

a membrane disposed between and in intimate contact with method and the anode;

a first flow field in fluid communication with the cathode opposite the membrane;

a second flow field in fluid communication with the anode opposite the membrane; and

a porous flow field member in fluid communication with the cathode opposite the membrane, wherein the porous flow field member comprises a porous support coated with a hydrophobic polymer.

46. The fuel cell system or a regenerative fuel cell system of claim 45, wherein the hydrophobic polymer is polytetrafluoroethylene and the porous support is a screen, a perforated sheet, a pierced sheet, an etched sheet, a felt, or a woven mesh comprising carbon or a material selected from the group consisting of niobium, zirconium, tantalum, titanium, nickel, cobalt, steel, and alloys comprising at least one of the foregoing screen metals.

47. The fuel cell system or a regenerative fuel cell system of claim 45, wherein the porous support is coated with polytetraflouroethylene.

48. The electrochemical cell of claim 45, wherein the porous flow field member further comprises screen.

49. An electrochemical cell system, comprising

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode opposite the membrane;

a second flow field in fluid communication with the second electrode opposite the membrane; and

a porous flow field member in fluid communication with the first flow field opposite the first electrode, wherein the porous flow field member has a gradient of porosity, and further wherein the porous flow field member comprises a porous support integrated with an electrically conductive material or a polymeric material.

50. In an electrochemical cell comprising a first electrode; a second electrode; a membrane disposed between and in intimate contact with the first electrode and the second electrode; a first flow field in fluid communication with the first electrode opposite the membrane; a second flow field in fluid communication with the second electrode opposite the membrane, a method for managing fluid flow comprises

introducing a quantity of fluid into the first flow field;

passing the fluid through a graded, porous flow field member in fluid communication with the first flow field opposite the first electrode, wherein the flow field member comprises a porous support modified to provide a selected hydrophilicity, a selected hydrophobicity, a combination of a selected hydrophilicity and a selected porosity, or , a combination of a selected hydrophobicity and a selected porosity

contacting the fluid with the first electrode.

51. The electrochemical cell of claim 50, wherein the porous flow field member comprises a first porous support having a first void volume, a second porous support having a second, different void volume, and a third porous support having a third, different void volume, wherein the first void volume is greater than the second void volume, and the second void volume is greater than the third void volume.